

**Effects of Money Supply on Investment Decision,
Analysis of Bangladesh Economy**

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Dedication

I lovingly dedicate this study to my parents, who support me in each decision of my life, and my Professors of Asian University for Women, who sow the seed of earning knowledge in me.

Acknowledgement

First of all, I would like to thank God for keeping me in sound health to do this research.

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Abstract

Investment is the part of optimal operating financing decision, and this verdict become more crucial when it is related to the uncertain capital or stock market and risky assets. Currently the money supply is very high in Bangladesh economy. More funds are available for the investors, but question is where to invest. Based on more risk more return strategy, Bangladeshi investors are investing more in Stock Market. In this study, researcher has tried to find the effect of this increased money supply on stock market investment mainly in two indexes DSEX and DSE 30. For this study, research has used the data of Bank of Bangladesh for money supply, and data of Dhaka Stock Exchange for DSEX and DSE 30 and run a regression to find the relationship between these variables.

Key Words: Money Supply, M2, DSEX, DSE 30

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1. Introduction

Everyone wants to be financially secure in today's growing world and for this reason people are interested in making more investments in different businesses. Bangladesh is one of the economies (Rehman and Yousaf 2010), where the people's attraction is increasing day by day (Reyhan 2009). They are ready to put their resources in different sectors in this economy. This inside cash flow is one of the major determinants of increasing money supply in this country (Amin 2010). Economists consider that the total sum cash, currency, and all other liquid instruments in a country's economy at a particular time is the total money supply (Investopedia). According to the data of Bangladesh Bank, money supply has an increasing trend from last five years.

Financial analysts believe that money supply is an important indicator of stock market behaviour. According to the expansionary monetary theory, with an increase in money supply prices of assets and commodities go up. Based on this theory, investment behaviour for the Bangladesh Stock Exchange can be determined. This theory explains that one of the main reasons of increasing prices is the currency depreciation. Based on the concept of future value, in the long run, the assets of stock markets can be depreciated too. However, information of investment portfolio shows an increasing trend of investment in Dhaka Stock Exchanges indexes.

Most of the literature tries to find the effect of different determinants of money supply on the stock exchange investment. Levin in 1997 explored the relationship between exchange rate, an important determinant of money supply, and the prices of the stock assets. Similarly, Kong (2012) found the effect of money supply on equity prices for Japanese economy. Very few of literature is available for the explanation of this phenomenon for growing investment in Bangladesh Stock Exchange. This study will provide an insight while using the definition of

money supply explained by Bangladesh Central Bank, and different indices making growing business in Dhaka Stock Exchange Ltd.

1.1 Objective

The main objective of the study is to prove the relationship of investment in risky assets with the expansionary monetary policy of Bangladesh. The study will try to explore whether the increasing money supply is one of the reasons of increasing trend of investment in Dhaka Stock Exchange Ltd.

Aim of this study is

- to explore the relationship between general indexes of Dhaka (DSEX) and Money Supply (M2).
- to find the effect of growth of the same M2 for another index DS30.

This study will try to answer the following question.

- Is there a positive relation between the investment decisions and money supply?

To answer the above question following hypotheses are needed to be tested

1.2 Hypothesis

- H_{01} : More growth in M2 has a positive impact on the growth of DSEX
- H_{02} : Growth of M2 is one of the significant reasons of the more business for DS30

If these hypotheses will be accepted, then this study will fill the gap between existing literature, and new research on Dhaka Stock Exchange.

1.3 Methodology

This study is a time series analysis for the last five years (2009-2013) for three different variables. Money Supply is an independent variable, and to discover the relationship between this money supply and stock exchange investment, this research will use two main stock exchange indexes in which most of the people are investing from last five years. Using these indexes values as regress and two different Simple linear regression models will be estimated. On the bases of results of these analyses, both the hypotheses will be accepted or rejected.

1.4 Structure of the Study

Following this introductory chapter, an outline of the whole research study is presented. *Chapter two* provides an in-depth overview of existing literature for the explanation of key terms used in this study. *Chapter three* presents the methodology used in this study. First section of this chapter explains different theories related to Monetary Policy and its effects on the economy as Stabilization Policy, and then second section is the explanation of Ordinary Least Square for the analysis of Time Series Data of Money supply and DSEX and DS30 indexes. *Chapter four* focuses on the results and aims to investigate the impacts of increasing money supply on DSEX and DS30. *Chapter five* is the conclusion of the whole study. This chapter synthesizes the major findings and conclusions, plus recommendations from this study.

2. Literature Review

2.1 Introduction

As explained in introduction, this is an exploratory study for the relationship between money supply, and indexes of stock exchange. This is purely a technical study, and many procedural terms have used. For the understanding, in section 2.2 of this chapter, I have explained different economic terms; for example, investment in financial sectors and money supply along with the brief introduction of two monetary giants in an economy. Section 2.3 has explained different literatures or scholarly articles who found various relationships between different types of investment in stock exchange, and the effect of these variables on the country's economy.

2.2 Definition of Economic Terms

2.2.1 Bangladesh Bank

Bangladesh Bank is the central bank of Bangladesh and top regulatory body of the country's monetary and financial system. According to the Bangladesh Bank Order, 1972, it has been working since 16th December, 1971. It has ten offices located in different district of Bangladesh including 4951 officials and staff as on November 30, 2012 (Bangladesh Bank).

Bangladesh Bank performs all the core functions of a typical monetary and financial sector regulator, and a number of other non core functions. Its primary function is to provide and regulate the money supply for an economy. It acts as a lender of last resort to the banking sector during financial crisis (Bangladesh Bank). It also regulates, and supervises commercials banks and non-bank financial institutions of the country, and supports the development of domestic financial markets (Bangladesh Bank).

2.2.2 Stock Exchange

The stock market or stock exchange is one of the most vital components of a country's economy as it channels fund from investors to the companies. Stock exchange is the place or market where shares of publicly held companies are issued and traded either through exchanges or over-the-counter markets (Investopedia). The business dictionary defines stock exchange as an institute organized, and regulated financial market where securities (bonds, notes, shares) are bought and sold at prices governed by the forces of demand and supply. Along with the above functions, Fellowes (2008) express few feature of stock market similar to normal market, where prices are settled by the buying and selling behaviour of the buyer and sellers. Stock market is one of the markets, where role of intermediary¹ or the broker is very important and clearly defined.

The stock market mainly provides opportunities to different companies, who want expansion in their business and growth in their capital. Stock exchanges perform different functions e.g. (1) primary markets where corporations, governments, municipalities, and other incorporated bodies can grow capital by issuing security such as bond or stock to the initial investors; and (2) secondary markets where previous issued security can be resold to other investors for cash which reduce the risk of investment and maintaining liquidity in the system (Mishkin 70).

Investment in Stock Exchange

An asset or item that is purchased with the expectation of generating income or appreciation in the future is defined as Investment (Investopedia). Keynes (1936) in his book "General Theory" defines investment as increment of capital equipment; for example fixed, working or liquid capital (Keynes 55). Thus, in economics, investment is the purchase of goods to be used in future to create wealth.

¹ a middleman who directs investor in buying and selling shares in the stock market (Saha 12)

Financial researchers show that investors do not always act rationally or reflect on the available information in their decision-making process scientifically. This behaviour of investment defines financial investment as a monetary asset purchased with the idea that the asset will provide income in the future or appreciate and be sold at a higher price (Investopedia). Financial investments include the purchase of bonds, stocks or real estate property. The paper defines stock exchange financial investment in stock market.

Keynes says assets can be used a store of wealth defined as speculative motive of holding money (Mishkin 543). Keynes divides the assets that can be used to store wealth into two categories: money and bonds. He believes that interest rates influence the decisions of holding money as a store of wealth and it is inversely related with the price of a bond (Mishkin 543). Stock market investment can be defined as speculation- trading in an asset, or a financial market, that has a considerable risk of losing most or the entire initial amount in expectation of a profitable gain (Investopedia). Optimist investors has a speculative motive of holding money to invest in stock market and the investors resell his shares when the stock prices to gain profit to other more optimistic investors (Mei et al. 226).

Besides Keynes, Tobin (1981) developed a model of the speculative demand for money, and according to him, people not only think about the expected return from asset versus another but most people are risk-averse, and the return of money is zero (Xueping 4). Bonds can have substantial fluctuations in price, and their returns can be quite risky, and sometimes negative (Xueping 4). His model suggests that people will hold bonds and money concurrently as stores of wealth since there is risk associated with bond whereas money has less risk (Xueping 4). The value of risk can be reduced in a portfolio by diversifying and with the proper knowledge of market and for this intermediaries play their role.

2.3 Theories of Financial Decision Making

Mario (2011) analyzed the effect of monetary policy taken by Federal Reserve Bank on U.S stock market uncertainty. The stock market uncertainty is divided into a linear and nonlinear dependence. The nonlinear and linear dependence between stock market confidence and uncertainty is measured by a copula-based Markov approach, and Granger causality tests respectively. The author concluded that causality run from monetary policy, and labor market conditions linear to stock market confidence and nonlinear to stock market uncertainty.

Similarly, Bijornland and Leitemo (2008) explored the relationship between asset prices and monetary policy in the U.S. represented by the S&P 500 and the federal funds rate respectively. The authors used a VAR model to measure the relationship, and found statistically significant interaction between interest rate setting in the US, and real stock prices that stock prices fall by 7-9 % due to the increase in the federal funds rate by 100 basis points.

Scharler (2004) investigated the same relation between the influences of monetary shocks on stock market returns, however used a general equilibrium model for the analysis. A monetary contraction increases interest rate, which also increases the cost of holding stocks, and decreases dividend payments because firms have to borrow working capital. As a result, the stock prices decrease. The author used the current and expected interest rate, and dividends as variables, and found that statistically significant relationship between monetary shocks, and stock returns although the magnitudes are small to some extent.

Agrwal et al. (2010) analyzed the relationship between stock returns- Nifty returns and Indian rupee-US Dollar exchange rates using daily data for the period of October 11, 2007 to March 9, 2009. The authors use Unit Root, Augmented Dickey–Fuller (ADF), and Granger

Causality test and found a negative correlation between stock returns and exchange rates and unidirectional causality running from stock returns to exchange rate.

Like Agrwal et al. (2010), Belke and Polleit (2005) tried to find whether the central bank can influence the stock market returns in Germany using the variables stock market return-dividend growth and central bank interest rate. The authors use ARDL-Approach for Co-integration Analysis and bounds testing approach and autoregressive distributed lag models by Pesaran and others to address the problem in spurious regression. They found that central bank interest rate has statistically significant impact on stock market returns in both short and long run.

Neri (2002) aimed to evaluate how exogenous monetary policy shocks affect the stock market indices in the G-7 countries and Spain using the structural VARs model. The impacts of monetary policy shocks on stock prices are evaluated using impulse responses and variance decompositions and a model is estimated for each country. The author found that contractionary monetary policy shocks, measured by exogenous increases in short-term interest rates have small, negative, and transient effects on stock market indices

Okpara (2010) used the variables- interest rate, Treasury bill rate of Central Bank of Nigeria, and Stock Market returns and Two Stage Least Squared Method with simultaneous equations to analyze the effect of monetary policy on the Nigerian stock market returns. The reduced form of set of the equations is tested using the Augmented Dickey Fuller Unit Root and Co-integration Test. He finds that monetary policy has significant impact on long-run stock market returns in Nigeria; for example, high Treasury bill rate reduces stock market returns.

Bordo, Dueker, and Wheelock (2008) intended to find the relationship among inflation, monetary policy, and U.S. stock market conditions during the second half of the 20th century. They uses hybrid Qual-VAR model, and examine different monetary shocks to analyze the

influence of them on the stock market. They found that inflation and interest rate shocks had particularly strong impacts on stock market, and conclude that central banks can contribute to manage stock market stability by minimizing unexpected changes in inflation.

Rapach (2001) analyzes the impacts of money supply, aggregate spending, and aggregate supply shocks on real US stock prices using a structural vector auto-regression model. The author found that each macro shock has significant impact on real stock prices. The real stock price responds to the various macro shocks conforming to the standard present-value equity valuation model and there is negative correlation between real stock returns and inflation.

Singh (2010) aimed to explore the causal relation between stock market index- BSE Sensex and three macro economic variables - wholesale price index (WPI), index of industrial production(IIP) and exchange rate (Rs/\$) of Indian economy . The author used correlation, unit root stationarity tests, and Granger causality test to measure the relationship. He found strong correlation between BSE Sensex and IIP, BSE Sensex and WPI but not between exchange rate and BSE Sensex.

Stoica and Diaconasu (2012) investigated the impact of monetary policy on equity indexes in European Union countries from January 2000 to February 2012 by analyzing the co-movement between interest rates and stock prices. They used co-integration and Granger causality tests, and found the existence of long and short term relationship between stock prices and interest rates. The results also show that co-movement between interest rates and stock prices are stronger during financial crisis than entire period in the long-run.

Singh, Mehta, and Varsha (2011) attempted to examine the casual relationship between index returns- Market capitalization, price/earnings ratio (P/E ratio), PBR and yield on stock, and the macroeconomic variables- employment rate, exchange rate, GDP, inflation and money supply in Taiwan. The author used linear regression model and Kolmogorov-Smirnov D

statistic normality test, and found that exchange rate, and GDP influence returns of all portfolios, while inflation rate, exchange rate, and money supply have negative relationship with returns of portfolios for big and medium companies.

Afroze (2013) attempted to find the influence of monetary policies taken by Bangladesh on the Dhaka Stock Exchange Limited (DSE) using the variables Board Money supply, Cash Reserve and Total Reserve Requirement to measure money supply and End period Annual Period General Index, and End Period Market Capitalization, and Annual Turnover to measure the performance of Dhaka Stock Exchange Limited. She used correlation analysis to observe linear relationship amongst the variables and t-test to test hypotheses and found statistically significant correlation amongst variables of money supply, and performance of DSE.

Barua, and Rahman (2006) tried to analyze the affiliation monetary policy and capital market indicators using a parallel analysis among the variables. The interest rate on NSD certificates and fixed deposits, Cash Reserve Requirement are used as monetary policy indicators and Dhaka Stock Exchange General Index (DGEN), DSE 20 Index are used as stock market indicators. The authors found that the impact of rise in stock market indicators is less clear cut and stock prices do respond to new reform measures and tax incentives even in the short run.

Khan et al. (2013) analyzed the effects of monetary policy, and exchange rate changes, and domestic inflation on stock prices in Bangladesh using the variables Board Money, Reserve Money and 91-day Treasury bill, Dhaka Stock Exchange General Index (DGEN), CPI, Nominal Exchange Rate. Johansen approach with Vector Error Correction model has used to analyze both long run and short run effects among the variables. The authors found a long run

relationship between 91-day Treasury bills and stock price only; as a result, the analysis is inconclusive to with respect to other variables.

Rahman (2012) explored differences in risk return behavior in the context of Dhaka Stock Exchange (DSE) based on the financial logic that risk taking must be compensated by extra return because most of the people are risk averse. The author collects data on daily end stock prices, DSE all share price index, weekly return of individual stocks to analyze the reward for taking risk at DSE. He calculates the return on composed zero beta portfolio using mean variance outlook of portfolio evaluation assuming the absence of risk free rate and found statistically significant relationship between risk and return where return is negative.

Hossain (2011) examined the behavior of stock returns in the Dhaka Stock Exchange (DSE), the efficiency of DSE in pricing securities, and the relationship between stock returns and conditional volatility using the variables- stock prices indices DSEG, DSI and DS20. The author uses GARCH (p, q)-M models, ADF and PP tests, and found a positive link between risk and returns for DS20, positive but not significant for DSI, and negative and very insignificant for DSEG index. Thus, it can be said that investors are rewarded for taking increased risk for the securities of DS20, and DSI but not for DSEG.

Saha (2012) aimed to find reasons of the stock market crash in Bangladesh in 2010-11 and roles of the regulators DSE, CSE, SEC and government of Bangladesh. The author has done a qualitative research, and collected data through self-administered questionnaire. He found the major causes of stock market crash are poor monitoring of regulators, corruption, lack of investor's knowledge, and Bangladesh Bank's intervention in stock market and so on. The paper ignores the influence of monetary policy taken by Bangladesh Bank on stock market crash.

Rahman and Moazzem (2011) intended to identify the casual relationship between the regulatory decisions taken by the Security Exchange Commission and volatility of the Dhaka Stock Exchange (DSE). The authors used Vector Auto-regressive (VAR) and found statistically and highly significant relationship between decisions taken by SEC and stock market volatility although the causality is negative.

Nguyen, Islam, and Ali (2001) analyzed the relationship effect of money supply M1 on the stock price indices in Bangladesh over the period 1999 to 2010. The authors applied Enders and Siklos procedure and Granger causality test. The results shows a long run asymmetric co-integration between the stock price index, and M1 indicating that the counter cyclical monetary policies affect stock market based on the different phases of business cycles.

3. Methodology

3.1 Introduction

Existing literature shows (with reference to section 2.3), financial markets and central banks have a significant relationship. Most of the financial researchers have discussed this behaviour with the help of different monetary variables and stock market indicators. Many researchers have also interpreted, different situations of association for these two main economic sectors. In this study, I have also tried to find the connection between increasing money supply in Bangladesh economy and increasing trend in two main indexes of Dhaka Stock Exchange. In this chapter, I have explained the methodology for this analysis.

In *section 3.2* of the following chapter, different theories and frameworks are explained which show the link between financial investment and money supply. *Section 3.3* explained the variables and data sources, which I have used for my study and definitions for these variables for particularly this study. Eventually in the last *section 3.4*, the methodology for this research has discussed.

3.2 Behavioral Theories of Money Supply and Investment

3.2.1 Investment Theory

Increasing money supply in the economy leads to an increase the prices of goods and services; consequently, there will be inflation in economy. In this case, normally the level of investment goes up because of high cost of production goes down.

Moreover, the Keynesian theory of investment emphasis on the importance of interest rates in investment decisions. Increasing money supply in the economy decreases the interest rate. A

fall in interest rate decreases the cost of investment; consequently planned capital investment projects on the margin increases (Keynes 59).

3.2.2 Keynes Liquidity Preference Theory

Keynes describes speculative motive for money demand as a store of value. He believes that interest rate plays an important role for the decision of money as liquid or store. An increase in interest rate leads to a fall in price of bond; consequently, the investors suffer negative capital gains. In this case, people might want to store their wealth as money because its expected return is higher; its zero return exceeds the negative return on the bond (Xueping 3). Therefore, people will be more likely to hold their wealth as money rather bonds, and the demand for money will be high. On the other hand, a low interest rate leads to an increase in price of bond; consequently, the investors earn more capital gains (Xueping 4). In this case, people might want to store their wealth as bonds and securities because its expected return is higher. Therefore, money demand is negatively related to the level of interest rates. Following the framework of Liquid Money (LM), if economy is at full equilibrium level then with the increase in money supply interest rate falls and this decrease in interest rate leads to investor to buy more securities and bonds.

3.2.3 Tobin's Theory of Liquidity Preference as Behavior towards Risk

Theories of demand for money that accentuate the role of money as "a store of value" are defined as assets or portfolio theory (Tobin 79). Portfolio theorist says that people hold money as part of their portfolio of assets, and the money demand depends on the return, and risk offered by the money, and other assets that people hold instead of money (ibid).

Tobin followed Keynes for the derivation of inverse relation of money demand and interest rate with the help of some additional concepts of uncertain expectations and risk avoidance

for an individual. He assumes that an individual holds a portfolio of assets consisting of risk free assets w_1 in cash money and w_2 in risky assets; for example, bonds and securities,

$$W_1 + W_2 = 1 \quad (3.1)$$

Money has risk free expected rate of return, $E_1 = R_f (\geq 0)$; therefore, variance of return, $\sigma^2_1 = 0$; on the other hand, risky assets has expected rate of return, $E_2 (> R_f)$; therefore, variance of return, $\sigma^2_2 (> \sigma^2_1)$. After simplification, the expected portfolio return is:

$$E_p = R_f + \left(\frac{E_2 - R_f}{\sigma^2} \right) \sigma_p \quad (3.2)$$

From the above equation, it can be said that, expected portfolio return, E_p is the sum of the risk free rate of return R_f and $\left(\frac{E_2 - R_f}{\sigma^2} \right)$ times the portfolio risk, σ_p . Equation 3.2 proves that amount of risk is directly related to expected returns of investment. The $\left(\frac{E_2 - R_f}{\sigma^2} \right)$ is the price of risk which calculates how σ_p and E_p can be traded to make portfolio choices (Tobin 81).

To examine investor's preference over expected portfolio return and portfolio risk, Tobin assumes that individual desire to maximize a utility function based on E_p , and σ^2_p , total variance of portfolio to derive, $\mu = \mu(E_p, \sigma^2_p)$

$$\mu = \mu \left(E_p - \frac{\gamma}{2} \sigma^2_p \right) \quad (3.3)$$

γ is a constant that represents the degree of risk aversion. After substituting in equations, Tobin derives the optimal proportion of the holding of risky asset, $W_2^* = \left(\frac{E_2 - R_f}{\gamma \sigma^2_2} \right)$; is called the mean variance model of assets demand and holding risky assets. An increase in interest rate with no change in expected risk from bonds and securities will increase the holding of the risky assets, W_2^* and money holding will decline (Tobin 82).

3.2.4 Modern Portfolio Theory

In Modern Portfolio Theory, Markowitz contradicts the finding of Tobin's theory that people invest in risky assets. According to his theory people are risk averter, but at the same time he said that securities markets are efficient² and that's why they are less risky.

3.3 Variables and Data Collection

I have chosen three variables for the testing of my hypothesis; one is money supply (M2) which is independent in my study and regressed two variables are Dhaka Stock Exchange general index (DSEX) and Dhaka Stock Exchange 30 Index (DS30).

Money supply is the total amount of money in circulation or in existence in a country. US Federal Reserve Systems defines money supply as a group of safe assets that households and businesses can use to make payments or to hold as short-term investments. For example, U.S. currency and balances held in checking accounts and savings accounts that are included in the measures of the money supply. Moreover, World Bank defines money supply as the total amount of money in the economy of a country. For this paper, M2 is taken as money supply, which is the sum of all liquid money (M1), which is all available cash, traveller's cheques, demand deposits and other checkable deposits in the economy (Mishkin 101), and broad money, which is total small denominations of time deposits, savings and money market deposit accounts and money market mutual fund shares (ibid).

Mathematically

$$\text{Money Supply (M2)} = \text{M1} + \text{Broad Money} \quad (3.4)$$

² Assets are re-priced literally every second of the day according to what news is immediately available. As new information enters the market it is quickly reflected in the prices of securities, and thus temporary pricing discrepancies are extremely difficult, if not impossible, to exploit for profit.

I collected these information from the monetary authority Bangladesh Bank data source. This data is available on monthly bases and I took the data for four years, from January 2010 to December 2013.

Dhaka Stock Exchange Broad Index (DSEX) is the benchmark or barometer index of the country's capital market, which reflects ninety seven percent of the total equity market capitalization. I used DSEX for my analysis and data was taken from Dhaka Stock Exchange data source. DSEX is the new name of an old index DGEN (Dhaka Stock Exchange General Index), which was abolished in December 2012. Value of this old index was calculated on the basis of price movement of individual stocks (Rasul 393) of the securities of A, B, G & N category, The companies of Z category were excluded in this general index calculation. While Stocks under the DSEX index must have minimum of six-month average daily traded value (ADTV) of one million BDT as of the rebalancing reference date, which include the securities of all companies. The business of DSEX is based on the free floating share³ methodology.

Stock Exchange did not replace the values of DGEN with new index DSEX, and did not mention any specific criteria for it. However, for my study, I used the data for all free floating securities of all categories companies between 2010 to 2012. First I calculated the daily averages and then converted them on monthly average to equate them DSEX. These values were surprisingly not very different from the values of DGEN.

DSE 30 Index (DS₃₀) consists of 30 leading companies which are considered secure to invest or Investable Index of Dhaka Stock the Exchange. It reflects approximately fifty-one percent of the total equity market capitalization. Second dependent variable for my analysis is DS₃₀ and data source is again Dhaka Stock Exchange. This index is also a replacement of an old

³ Free floating share is generally described as all shares held by investors, other than restricted shares held by company insiders. It does not include restricted shares, which are owned by company management, officers and other various insiders because it's assumed that those shares are being held on a very long-term basis

index DS₂₀, which consists of share prices excluding mutual funds⁴; debenture⁵ and bonds of top selected 20 companies at Dhaka Stock Exchange till December, 2012. DS₃₀ stocks must have minimum of three-month average daily traded value (ADTV) of 5 million BDT as of the rebalancing reference date. In certain circumstances, the liquidity condition can be relaxed to 3 million BDT to ensure that sufficient companies are in the index.

Like DSEX, value of this replaced index was also missing for the previous years. For filling this gap from 2010 to 2012, I collected the data of share prices for all the companies, listed for DS₃₀, and calculated the daily weighted average for these companies and then converted this daily weighted average value into monthly averages to use them as DS₃₀.

3.4 Methodology

Bangladesh bank reports positive growth of money supply from last few years. (Fig. 3.1) shows this recent trend.

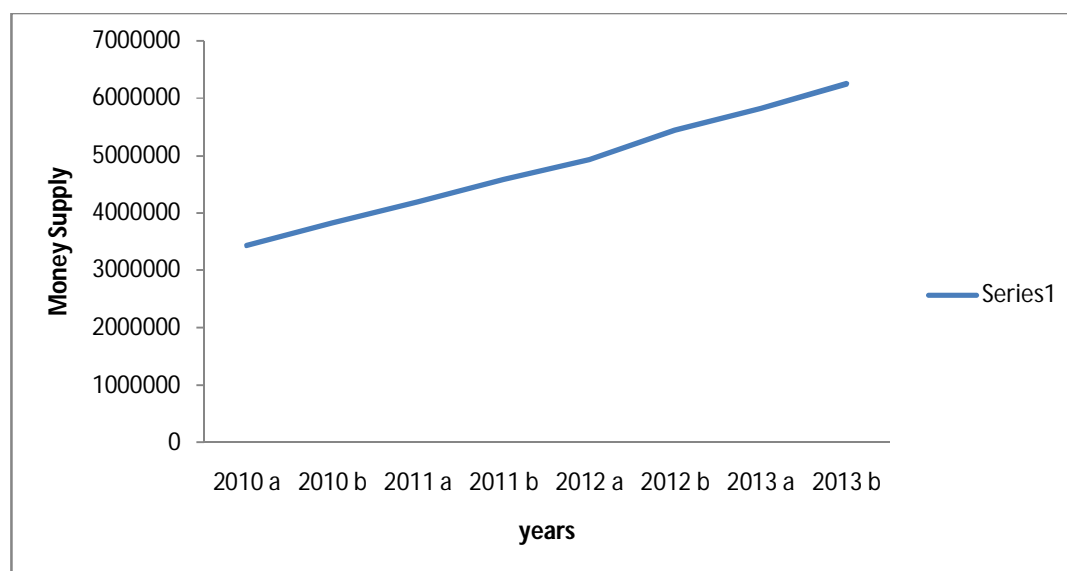


Fig 3.1: Trend of Money Supply from 2010 to 2013

⁴ Collective pooled Investment for purchasing securities.

⁵ Medium to long term debt instrument

Similarly, increasing trend of investing in DSEX and DS₃₀ is also observed. Based on all above mentioned theories, there may be a possibility of relationship between above mentioned variables.

- H₀₁: More growth in M2 has a positive impact on the growth of DSEX
- H₀₂: Growth of M2 is one of the significant reasons of the more business for DS₃₀

Unit of Analysis The unit of analysis is the respective months with in the duration of 2010 to 2013.

3.4.1 Linear Regression Model

Relationship measures the changes in dependent variable based on the change in independent variable is known as linear regression (Coolidge 175). To check the effect of money supply increment on the stock market index, this linear regression model is used as follows

$$DSEX = f(M2) \tag{3.5}$$

$$DSEX = \alpha + \beta M_2 \tag{3.6}$$

and

$$DS30 = f(M2) \tag{3.7}$$

$$DS30 = \alpha + \beta M_2 \tag{3.8}$$

Unit Root Test: (Stationarity Test)

Time series data analysis is assumed to be stationary which means that mean and variance are constant over time. Moreover, the value of covariance between two time periods of the series depends only on the distance or lag between the two time periods and not on the actual time

at which the covariance is computed (Agrwal et. al, 2010). A unit root test is applied to check whether the data series is stationary or not. As the data used for this study is also a time series, so I also checked the stationarity for that.

4. Explanation of the Results

4.1 Introduction

Contingent on the methodology, given in sub-section 3.4.1, data (discussed in section 3.3) was analysis. Results of this analysis are discussed in the *section 4.2* of this chapter.

4.2 Results

4.2.1 Results for DSEX

To test the first hypothesis, money supply has a positive effect on investment in DSEX, I run the first model given in equation 3.6. Using E-views, I regressed the DSEX on M2, and found the outcomes presented in table 4.1.

Table 4.1: Results for DSEX

Dependent Variable: DSEX				
Method: Least Squares				
Date: 04/18/14 Time: 07:48				
Included observations: 49				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9949.048	600.4111	16.57039	0.0000
M2	-0.000968	0.000121	-7.984599	0.0000
R-squared	0.575635	Mean dependent var		5247.962
Adjusted R-squared	0.566606	S.D. dependent var		1251.102
S.E. of regression	823.6337	Akaike info criterion		16.30529
Sum squared resid	31883507	Schwarz criterion		16.38251
Log likelihood	-397.4796	Hannan-Quinn criter.		16.33458
F-statistic	63.75381	Durbin-Watson stat		0.437584
Prob(F-statistic)	0.000000			

Stand on these results, R squared value shows that more than 57 % values are explained, so data is reliable, and we can trust the results obtained from this data. F-statistics are significant so model is also best fit. As a result of this model, M2 is highly significant even at 1 % level of significance, and can affect the DSEX negatively, although is very minor effect. Very low value of Durbin-Watson stat shows that has a problem of stationarity means any or both of our variables can be non-stationary. To remove this problem unit root test had applied. Applying Unit root test, it is clear that both the variables M2, and DSEX have the unit roots at level. To remove the problem of unit root, we run the same test for the first difference. In case of M2, null hypothesis was not rejected when we tested it for none, but in case DSEX, null hypothesis was accepted for the case of intercept, and trend. Thus, the final decision at level one was again that data at difference 1 has unit root. In that case, we used the second difference, and found that in case of M2, data was stationary at difference 2, and same for DSEX. We run the regression again for the second difference of the original data and found the following results table 4.2.

On the basis of these results, value of Durbin- Watson stat is better than before and acceptable, as well as the value of slope is also improved (-0.001020) as compared to the previous value (-0.000968). Although, this value of β is very small but is strongly significant at 99 % level of confidence interval. This shows that money supply is an important variable and has significant effect in investment decision, but negative sign of β explains that relationship between the two variables is inverse. On the basis of these results, we reject our null hypothesis (H_0). With an increase in money supply investment in DSEX is decreasing.

Mathematically we can write it as

$$DSEX = 10264.28 - 0.001020M_2$$

Very large value of intercept indicates that many other factors can also affect the decision for the investment in DSEX (Khan et al. 2013).

Table 4.2: Results for DSEX after Unit Root Test

Dependent Variable: D2DSEX				
Method: Least Squares				
Date: 04/18/14 Time: 10:35				
Sample (adjusted): 2010M04 2014M01				
Included observations: 46 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10264.28	1751.966	5.858722	0.0000
D2M2	-0.001020	0.000347	-2.937861	0.0052
R-squared	0.163991	Mean dependent var		5207.670
Adjusted R-squared	0.144991	S.D. dependent var		2398.170
S.E. of regression	2217.509	Akaike info criterion		18.28866
Sum squared resid	2.16E+08	Schwarz criterion		18.36817
Log likelihood	-418.6392	Hannan-Quinn criter.		18.31844
F-statistic	8.631030	Durbin-Watson stat		2.668656
Prob(F-statistic)	0.005244			

4.2.2 Results for DS_{30}

Similar to the first hypothesis, I tested the second hypothesis to test whether money supply has the same relationship with DS_{30} like DSEX or this index show a different behaviour towards money supply. I used equation 3.8 and estimated it in E-views.

This time results were more disturbed as compared to DSEX. Value of R^2 is only twenty seven percent; means only twenty seven percent observations are explained. However, value of F statistic 17.0615 and is significant at 1 %. So model has no problem and we can estimate the value of dependent variable by OLS (Table 4.3).

Table 4.3: Results for DS₃₀

Dependent Variable: DSE30				
Method: Least Squares				
Date: 04/18/14 Time: 10:51				
Sample: 2010M01 2014M01				
Included observations: 49				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2541.072	188.5770	13.47498	0.0000
M2	-0.000157	3.81E-05	-4.130501	0.0001
R-squared	0.266325	Mean dependent var		1777.258
Adjusted R-squared	0.250715	S.D. dependent var		298.8482
S.E. of regression	258.6868	Akaike info criterion		13.98907
Sum squared resid	3145186.	Schwarz criterion		14.06629
Log likelihood	-340.7323	Hannan-Quinn criter.		14.01837
F-statistic	17.06104	Durbin-Watson stat		0.359817
Prob(F-statistic)	0.000147			

As a result of this model, M2 is highly significant even at 1 % level of significance, and affect slightly the DS₃₀ negatively. Poor value of Durbin-Watson statistic, which is less than one, is again an indicator of any data problem which is the stationarity. Again, applying Unit root test for DS₃₀, and found that DS₃₀ becomes stationary at first difference. Then we run the regression again for new data sets of M2 at second difference and DS₃₀ at first difference.

New results after Augmented Dickey–Fuller test for unit root are depicted in table 4.4. Although, only little improvement is observed in the values of R², but value of Durbin-Watson is now satisfactory. The value of β has also improved from 0.000157 to 0.000207. This trend of DS₃₀ is also negative but significant like DSEX. So money supply can also be a determinant of decision for investment for this index as in case of DSEX. However negative

slope value shows that our null hypothesis is rejected, as according to that a positive effect of increase in money supply on the investment for DS_{30} was assumed (section 3.2).

Table 4.4: Results of DS_{30} after Unit Root Test

Dependent Variable: DDSE30				
Method: Least Squares				
Date: 04/18/14 Time: 10:49				
Sample (adjusted): 2010M04 2014M01				
Included observations: 46 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2817.016	252.7587	11.14508	0.0000
D2M2	-0.000207	5.01E-05	-4.132079	0.0002
R-squared	0.279563	Mean dependent var		1790.945
Adjusted R-squared	0.263190	S.D. dependent var		372.7074
S.E. of regression	319.9232	Akaike info criterion		14.41654
Sum squared resid	4503438.	Schwarz criterion		14.49605
Log likelihood	-329.5805	Hannan-Quinn criter.		14.44633
F-statistic	17.07407	Durbin-Watson stat		1.278805
Prob(F-statistic)	0.000158			

Mathematically we can write it as

$$DS_{30} = 2817.016 - 0.000207M_2$$

Value of intercept is also very large in this case, but comparatively to the DSEX case it is less.

5. Conclusion and Suggestions

As per results discussed in the previous chapter both the hypotheses are rejected. From these results, it is clear that although money supply plays a vital and significant role in decision making for investment in stock exchange, but it might have an inverse relation. Therefore, this study does not confirm the traditional theories of Keynes and Tobin, who said that with the increase in money supply, demand for money goes up, and this high demand is for the investment in bonds and securities. These results confirm the theory of inflation that with the increase in money supply, prices of assets go up, and purchasing power goes down. As a result, with an increase in money supply the investment in stock exchange is decreased.

These results confirm that only money supply increment is not the reason of more investment in risky assets. If it could be true then, world could not face the crisis of 2008. So it is important to make some careful portfolio of investment and need complete information about the stock market before the investment in different stock variables.

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